CONDITION NUMBER AND CONDITIONING IN SOLVING LINEAR SYSTEM OF EQUATIONS

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In this research, the basic concepts underlying the theoretical basis of performing numerical computations are studied. An important concept which has to be considered when solving a problem numerically is the conditioning behavior of the problem. Preconditioning is the application of a transformation, which is a preconditioner that conditions a given problem into a suitable form so that appropriate numerical methods can be used successfully. When a problem is ill-conditioned, preconditioning can reduce the condition number of the problem so that it is less sensitive to rounding errors in numerical computations. In this research, three types of preconditioning techniques which are polynomial preconditioning, diagonal preconditioning and right preconditioning are studied and presented. An algorithm related to the preconditioning is constructed and implemented and is applied for solving some selected problems using MATLAB. The preconditioning technique can be applied to reduce the condition number of an ill-conditioned matrix. It is also observed that by preconditioning, an ill-conditioned system can be converted to a better conditioned system by reducing the condition number of the coefficient matrix of the system. This study illustrates that the accuracy of the solution of a system of linear equations is related to the condition number of the coefficient matrix. The smaller the condition number of the matrix, the more stable is the matrix and the more accurate is the solution obtained. Therefore, conditioning is important for handling the stability and sensitivity to rounding errors which are related to the perturbation behavior of the system.

UNDERSTANDING OF THE DYNAMICS OF HAND, FOOT AND MOUTH DISEASE USING ODES BY USING MATHEMATICA

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Hand, foot and mouth disease (HFMD) is a mild infectious disease with no specific treatment to cure. Since it has no specific treatment to cure, thus the study of the dynamic of the disease is needed. S(Susceptible), I(Infected), R(Recovered) model is introduced by Ross and Hudson in 1916 in order to study the probabilities of a prior pathometry. Since 1926, SIR model becomes famous especially in order to study the disease transmission between susceptible and infective individuals. By using the framework of SIR model, we investigate the dynamic of HFMD. We also extent the model by taking into account the latent class in the model developed. We analyse the dynamic process by using system of Ordinary Differential Equations and also the analysis of multivariable stability analysis. For both models, we consider the disease free equilibrium and endemic equilibrium.